Monitoring and prediction of changes in water-related disaster risk -Research Projects on Climate Change-

ICHARM has participated in the following climate change–related research programs led by MEXT.

1) Program for Risk Information on Climate Change (SOUSEI program): 2012–2016

Under this program, research was conducted to develop methods for quantitatively projecting how future risks of floods and droughts will change under global warming, and how these changes may affect society, using CMIP5-generation climate projection data. Within this framework, ICHARM implemented the project "Water-related disaster risk assessment and creation of adaptation information in Asia" as part of Theme D: Precise impact assessments on climate change (Leader: Professor NAKAKITA Eiichi, Disaster Prevention Research Institute, Kyoto University).

This project selected five target basins: the Indus River (Pakistan), the Chao Phraya River (Thailand), the Solo River (Indonesia), the lower Mekong River (primarily Cambodia), and the Pampanga River (Philippines). For these basins, the project team developed and examined methods for locally applying flood and drought hazard projections based on GCM outputs at the river-basin scale while accounting for uncertainty. The team also developed fundamental techniques for assessing flood and drought risks and conducted assessments of risk changes under climate change. The results showed that, in terms of flood risk assessment, many basins exhibited increases in rainfall, inundation extent, and agricultural damage. For drought risk assessment, some basins showed changes in the timing and duration of the rainy and dry seasons. Further details are available at the following websites:

ICHARM: https://www.pwri.go.jp/icharm/research/articles/project-sousei.html

SOUSEI: https://www.jamstec.go.jp/sousei/eng/index.html

2) Integrated Research Program for Advancing Climate Models: 2017–2021

This program aimed to support the implementation of climate-change adaptation measures in Asia–Pacific countries by projecting future changes in hazards that trigger water-related disasters in the region, and by establishing a foundation for conducting impact assessment studies in collaboration with local researchers and practitioners. Within this program, ICHARM carried out the sub-project "4.1. Prediction of changes in water-related disaster hazards in Southeast Asia and the Pacific," which formed part of "4. Hazard assessment in Asian and Pacific countries and international cooperation" (Representative: Professor TACHIKAWA Yasuto, Graduate School of Engineering, Kyoto University), under Area Theme D: Integrated Hazard Prediction (Area Representative: Professor NAKAKITA Eiichi, Disaster Prevention Research Institute, Kyoto University).

This sub-project focused on the Davao River basin in Mindanao, the Philippines, and river basins in Java, Indonesia. In these regions, the project team conducted water-related disaster risk analyses and, as part of efforts to understand current local needs and capacities for climate-change adaptation and to support the

implementation of adaptation measures, discussed action plans with key stakeholders of the “Platform on Water Resilience and Disasters” in each country. Along with these activities, the team also developed the Online Synthesis System for Sustainability and Resilience (OSS-SR), a knowledge-integration platform that brings together data, expertise, information, experience, know-how, and technologies for reducing water-related disaster risks. By using this system as an online learning environment, the team launched a prototype initiative to cultivate facilitators capable of translating the latest scientific and technological knowledge into societal practice.

ICHARM: https://www.pwri.go.jp/icharm/research/articles/project-tougou_j.html

SOUSEI: https://www.jamstec.go.jp/tougou/eng/index.html

3) MEXT-Program for the Advanced Studies of Climate Change Projection (SENTAN): 2022-

This program aims to further advance the climate change research promoted by MEXT. It supports research and development to reduce uncertainties of future projections through advances in climate change simulation technologies, to analyze climate change mechanisms, and to improve both the accuracy and usability of climate prediction data. The program manages these research activities in a coordinated manner to generate and provide scientific evidence that can inform effective climate change measures, including adaptation strategies and mitigation efforts towards a decarbonized society.

In 2022, the program established four main research themes. ICHARM participates in Subject D: International cooperation for hazard and risk assessment in the Asia-Pacific region (Representative: Professor TACHIKAWA Yasuto, Graduate School of Engineering, Kyoto University), under Area Theme 4: Development of an integrated hazard projection model (Representative organization: Kyoto University). ICHARM has undertaken tasks focused on the Philippines, including the development of a water circulation model and a locally calibrated OSS-SR.

SENTAN: https://www.jamstec.go.jp/sentan/eng/index.html